8a) $\lim\limits_{x\to 8} \dfrac{\sqrt[3]{x}-2}{x-8}$

Let $a=\sqrt[3]{x}$

$a^3 = x$

$= \lim\limits_{a\to 2} \dfrac{a-2}{a^3-8}$

$= \lim\limits_{a\to 2} \dfrac{a-2}{(a-2)(a^2+2a+4)}$

$= \lim\limits_{a\to 2} \dfrac{1}{a^2+2a+4}$

$= \dfrac{1}{2^2+2(2)+4}$

$= \dfrac{1}{12}$

c) $\lim\limits_{x\to 1} \dfrac{\boxed{x^{\frac{1}{6}}}-1}{x-1}$

let $\boxed{a = x^{\frac{1}{6}}}$

$a^6 = x$

$a = (1)^{1/6}$

$= \underline{1}$

$= \lim\limits_{a\to 1} \dfrac{a-1}{a^6-1}$

$a^6 = \underbrace{a^2\cdot a^2\cdot a^2}$

$1^6 = 1\cdot 1\cdot 1$

$= \lim\limits_{a\to 1} \dfrac{a-1}{(a^2-1)(a^4+a^2+1)}$

$= \lim\limits_{a\to 1} \dfrac{\cancel{(a-1)}}{\cancel{(a-1)}(a+1)(a^4+a^2+1)}$

$= \dfrac{1}{(2)(3)}$

$= \dfrac{1}{6}$

d) $\lim\limits_{x\to 1} \dfrac{x^{\frac{1}{6}}-1}{x^{1/3}-1}$

let $a = x^{1/6} \Rightarrow a^2 = \left(x^{1/6}\right)^2$

$a^6 = x$

$a^2 = x^{2/6}$

$a^2 = x^{\frac{1}{3}}$

$= \lim\limits_{a\to 1} \dfrac{a-1}{a^2-1}$

$= \lim \cancel{(a-1)}$

$= \frac{1}{2}$

L6 (1.6) Continuity

Recall: The left and right side limits must be equal for a limit to exist.

A function, f(x), is said to be continuous at x = a if

1- the limit at x = a exists $\longrightarrow \lim_{x \to a} f(x) = \#$

2- the function value at x = a is defined $\longrightarrow f(a) = \#$

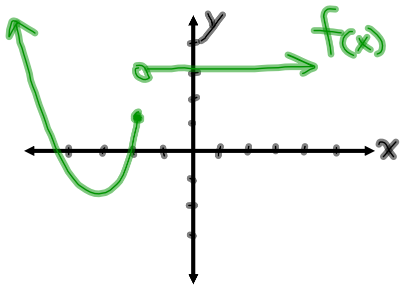
3- $\lim_{x \to a} f(x) = f(a)$

Discontinuities can be broken up into three types:

a) a jump discontinuity
b) a removable discontinuity
c) an infinite discontinuity

Ex: Identify where each of the following functions is discontinuous and explain why. State the type of discontinuity.

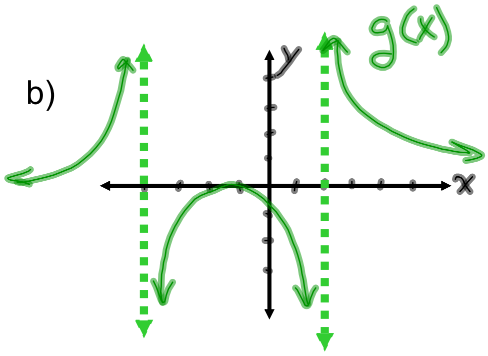
a)



Type: a jump discontinuity

f(x) is discontinuous at $x=-2$ because $\lim_{x\to -2} f(x) = DNE$.

b)



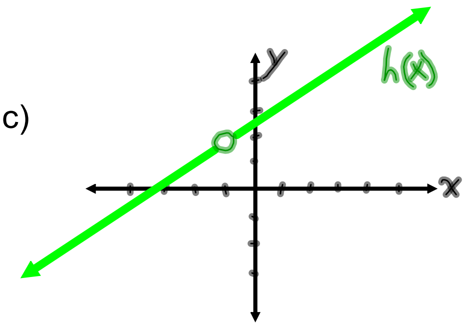
g(x) is discontinuous at $x=-4$ and $x=2$ because for both cases

$\lim_{x\to -4} g(x) = DNE$ &

$\lim_{x\to 2} g(x) = DNE$.

It is an infinite discontinuity

c)



At $x=-1$ there is a (point) removable discontinuity because the function value at $x=a$ is not defined. ie. $f(a) \neq \#$.

Assigned Work:

Read summary on p.51

p.52 #4ace, 5bdf , 6, 11,
13, 14, 16